UTILISATION OF
INSAT 1B
FOR HIGHER EDUCATION

ASSOCIATION OF INDIAN UNIVERSITIES

© Association of Indian Universities

Published by Association of Indian Universities
AIU House, 16 Kotla Marg, New Delhi-110002
and printed at Tara Art Press, New Delhi-110002

FOREWORD

According to the recommendation made at the National Seminar on 'Contemporary Teaching Methods in Higher Education' organised by the Association of Indian Universities during the Post-Centenary Silver Jubilee celebrations of the University of Madras, a Task Force on the "Utilisation of INSAT-1B for Higher Education" was established with Dr. R.G. Takwale,then Vice-Chancellor of University of Poona as Chairman. Members of the Task Force were drawn from the various Ministries including Information and Broadcasting, Education, and Electronics as well as Doordarshan,University Grants Commission, British Council, U.S.Educational Foundation in India and Media Research Centres of different universities.

Initially the terms of reference were to go into all aspects of utilisation of INSAT-1B. As a result of discussions in the meetings of the Task Force, the terms of reference were made broad-based to include new and modern technologies namely Computer Technology, Video Technology, Satellite Technology and other interactive networks. Accordingly, this report deals with not only details of these Technologies and their impact, but systematically presents the state of Art in the practice and implementation of these new technologies in various organisations in India like university centres, Department of Electronics, Doordarshan, Central Institute for Educational Technology and the like through a scientifically prepared questionnaire to solicit information from them.

The Task Force has analysed the impact of the modern technologies in developing and developed countries, and also the initial impact these have made in India. Thus, the Task Force has come out with practical recommendations in terms of nature and diffusion of technology, the problems likely to be faced in implementation, the infrastructural support needed to be provided to colleges, institutions and others including financial commitments and implications. Some of these recommendations can be implemented at the level of the individual institution with its own or possibly some additional resources while others are to be implemented by the Government.

It is hoped that the recommendations of the A.I.U. Task Force will be implemented within the first two years of the 7th five year plan so that the initial investigations on their success or otherwise will be made and further implementation modified on the basis of such results of investigation.

It is my privilege to thank Dr. R.G.Takwale, Chairman, Prof. V. Natarajan, Member Secretary and his staff who have given much of their time to the work of the Task Force. Special thanks to Prof. Yashpal, Department of Science and Technology, Dr. P. Deshpande, British Council and Prof. Ashok Chandra, Ministry of Education who have made useful contribution to the deliberations of the Task Force.

New Delhi
November 1984

JAGDISH NARAIN
Secretary
Association of Indian Universities

CONTENTS

SECTION 1 PREAMBLE

SECTION 2 MODERN TECHNOLOGIES AND THEIR IMPACT

- COMPUTER TECHNOLOGY
- VIDEO TECHNOLOGY
- SATELLITE TECHNOLOGY
- INFORMATION COMMUNICATION NETWORKING
- IMPACT ON UNIVERSITIES

SECTION 3 EXPERIENCES IN THE USE OF MODERN TECHNOLOGIES

EXPERIENCES FROM INDIA

- UNIVERSITY GRANTS COMMISSION
- DOORDARSHAN
- DEPARTMENT OF ELECTRONICS
- MINISTRY OF EDUCATION

EXPERIENCES FROM OTHER COUNTRIES

SECTION 4 FUTURE PERSPECTIVES

- TECHNOLOGY OF EDUCATION
- TECHNOLOGY IN EDUCATION
- RESEARCH AND DEVELOPMENT PROBLEMS ETC.
- INDIAN SITUATION AND USE OF TECHNOLOGY FOR HIGHER EDUCATION

SECTION 5 RECOMMENDATIONS

APPENDICES

APPENDIX I : LIST OF MEMBERS

APPENDIX II: QUESTIONNAIRE

BIBLIOGRAPHY

PREAMBLE

Launching of INSAT-1B marks the beginning of the slow communication revolution in India. The communication satellite is likely to link every family, village and institution through television net-work to the educational, cultural and developmental information transmitted through the net-work. This communication net-work would become extremely versatile and powerful with the utilisation of computer technology for information processing. The micro-computers and communication technology are creating world-wide information base that may be made available easily and econominally in near future to every zone in the country.

The communication information net-work created at regional, national and global level may change radically future approaches, methods and functions of social, cultural and economic institutions in this country. By anticipating the potential of the new technology and its possible and inevitable spread, it is necesary to prepare ourselves to accept and utilize the change efficiently for the development and welfare of our society.

A national seminar on 'Contemporary Teaching Methods and Technologies in Higher Education', organised jointly by Association of Indian Universities and the University of Madras to mark its Post Centenary Silver Jubilee Celebration, decided to constitute a Task Force to study and report on these changes.

The points of reference to Task-Force in general are:

(a) to study the nature and extent of the spread of new technologies for information communication in future and possibility of adoption and untilisation of new technologies in social, economic, cultural and educational institutions in our country.

(b) to study effects of the information communication net-work on the approaches, methods of working and functions of the institutions in general and Colleges and Universities in particular.

(c) to study the problems arising out of the net-working such as reliability and standardisation of information and possible exploitation of the net-work for selfish and narrow interest etc., and to report on the measures to ensure reliability and accuracy.

(d) to suggest measures for creation of awareness of the changes and development of expertise for full utilisation of the net-work for efficient development and welfare of our people.

The Task Force formed by the Association of Indian Universities as a part of its responsibility to study the communication changes in the offing and to contribute its efforts in the task of preparing the educational system and the society to adopt the communication revolution for national welfare and development.

The task force met in Delhi on 25th November, 1983, 2nd April, 1984 and 14th September, 1984. The Task Force was appointed under the Chairmanship of Professor R.G.Takwale, Vice-Chancellor, University of Poona. The following members participated in the deliberations of the Task Force.

1. Dr. R.G. Takwale
   Vice-Chancellor, University of Poona,

2. Dr. Ashok Chandra
   Department of Electronics
   (Now Education Adviser (Tech.)
   Ministry of Education)
   New Delhi-110001.

3. Prof. C.S. Jha
   Education Adviser (Tech.)
   Ministry of Education and Culture,
   (Now Prof. of Electrical Engg.)
   IIT,
   New Delhi.

4. Prof. Rais Ahmed
   Vice-Chairman, University Grants Commission,
   New Delhi-110002.

5. Dr. Prakash Deshpande
   British Council,
   Rafi Marg,
   New Delhi-110011.

6. Mr. R.S. Shastri
   Director (Engg.)
   Directorate of Doordarshan,
   6th Floor, Loknayak Bhawan
   New Delhi-3

7. Shri K.S. Karnik
   Space Application Centre
   Ahmedabad-380053.

8. Dr. E. Balagurusamy
Sr. Consultant and Professor of
Information Technology,
Institute of Public Enterprises,
Osmania University Campus
Hyderabad-500007.

9. Mr. Joginder Singh
United States Educational Foundation in India
Fulbright House,
12,Hailey Road,
New Delhi-110001.

10. Mr. R.S.Lugani
Principal, Delhi Public School,
Sector XII, R.K. Puram,
New Delhi-110022.

11. Prof. A.J. Kidwai
Mass Communication Research Centre
Jamia Milia Islamia, Jamia Nagar,
New Delhi-110025.

12. Prof. P. Sen
Dean, Faculty of Engineering and Technology,
Jadavpur University
Calcutta-700032.

13. Dr. Jagdish Narain
Secretary, Association of Indian Universities,
New Delhi-110002.

14. Prof. V. Natarajan------Member Secretary
Project Director (Exams.)
Association of Indian Universities,
New Delhi-110002.

MODERN TECHNOLOGIES AND THEIR IMPACT

Introduction

Invention of a transister by Bell Telephone in 1948 marks the beginning of the technological breakthrough in electronics. Sucessive developments of Integrated Circuit (IC) in 1959 and Microprocessor in 1971 are the important stages in micro-miniaturization in electronics. The development of integrated circuits on a silicon chip progressed as shown below

1951	1 circuit per chip
1964	10 circuits per chip
1970	1000 circuits per chip
1976	32000 circuits per chip
1982	100,000 circuits per chip

The rate of growth in micro-miniaturization shows no sign of slowing down. Besides enlarging scope of functioning, a chip requires far less precious silicon material and electric power for operation. Further the micro-circuits are fixed in the solid material and therefore are far more reliable and sturdy. Automation in this advanced technology has helped in producing very large quantity thereby reducing cost substantially. Micro-electronics is the only sector of industry that is giving products of more versatile nature, smaller size and reduced cost, even when cost of everything else is going up.

The micro-electronics is now entering in every walk of human endeavour and is developing such situations which will transform the way we work learn, play, shop and manage our everyday lives. Microprocessors have entered into industry and have helped its automation, raised reliability and quality. In fact the new technologies are now creating automated factories, offices, markets, banks etc. and heralding into post-industrial era.

Micro-electronics has entered into communication and computers and created another revolution in storing and disseminating information. Computers store and manipulate information and communication systems transmit the information from one point to another. Geo-centric satellites have helped transmission of information from one point to any other point on the earth, thus shrinking space and bringing people all over the world closer.

Insat - 1B is the precursor of the communication revolution in India. New communication processing media with audio-visual communications are percolating quite rapidly in economic, industrial and social life of our country. The higher education has to prepare itself to adopt and use the new technologies for various functions of educational institutions. In this section we will study the new technologies, their characteristics and availability in our situations.

COMPUTER TECHNOLOGY

Depending on stage of development the computers are sometimes described as first, second, third and fourth generation according to the corresponding technology of valves, transister, Integrated Curcuits(IC), Large Scale Integrated (LSI) Circuits and Very Large Scale Integraed (VLSI) Circuits used. They are also classified as Mainframe Computers, Mini-Computers and Micro-Computers depending on the power of the machine to process large number of transactions or operations. Mainframes usually have many peripheral devices such as card readers, magnetic disc and tape units, line printers and terminals. Micro-computers are small computers often designed for single user and are based on micro-processor chips, It has keyboard and other peripherial devices, small printer or Video Display Unit (VDU). The Video Display Unit could be the home Television (TV) also. The Mini-computers are in between the Mainframe and Micro computers and differ in terms of peripheral facilities. The Mini-computers have, like mainframes, timesharing devices and terminals, printers, provision of large memory storage etc.

Computer is a device which can store large data by electronic recording and process the data. The memory is measured in terms of K's or Kilos and 1K Byte character memory is the capacity to store 1024 charac ters of information. One MB or Mega Byte memory is 1000 K Byte. In terms of pages or books i.e. to store

Memory required is 2.5 K Byte for one printed page
One book (300 pages) will require 750 KB = 0.75 MB

A floppy disc of 8 inch (double side, double density) of about one MB memory would easily store one and half books of each 300 pages. Winchester disc of 15 MB memory can store 20 books. The IBM 3850 mass store which can store material of 200,000 books. The recent device of video disc of the size of a long playing record can store on both the sides material of 3200 books. All this information should give an idea of the fantastically high capacity of electronic data storing.

Every computer has a CPU i.e. Central Processing Unit and Memory or Storage facilities. A 64K Computer has its primary memory of 64 Kilo Bytes and is ussually classified as Read Only Memory (ROM) or Random Access Memory (RAM). The ROM memory is usually not altered and is used to store the master programmes of the Computer. The RAM memory is used for storing data or programmes and can be manipulated at will.

The computer can perform very large number (about millions) of operations per second. Further, the access to any selected part of the data stored is also very fast and the required out put can be printed or seen on the screen. It can also be transmitted through telephone cables or through microwave and satellite communication and delivered at the terminal with appropriate reception facilities.

In the field of education library serves the purpose of storage of knowledge and dissemination of books to readers. The whole process of writing books, publishing, storage and dissemination gets radically changed with the new technologies of electronic storage devices, computers and communication.

Library functions-comparison between old and new technologies

Function	Old Technology	New Technology
Text entry edit and composing	Typing,typesetting	Electronic word-processing, Optical Character Recognition (OCR)scan
Replication	Printing	Computer terminal, display,videodisc manufacturing.
Storage	Shelving, cataloguing	Digital mass store, Videodisc,floppies, tapes.
Search, select retrieve	Catalogue search, browsing	Computer soft-ware
Communications	Mail,freight, personal travel	Computer net-work, teletext,Cable TV, Satellite, Videodisc, magnetic tape, discs, floppy disc.

VIDEO TECHNOLOGY

Video-tape has come-up as a new technology to store audio-visual images on magnetic tapes. It is very convenient to prepare video programmes, since the entire process of developing films, preparing negatives, positives in optical or film photography is eliminated. At present 3/4" video tapes are used for broadcasting and 1/2" tapes of domestic and general use. Still the resolution of the picture does not compare well with the resolution of films. However it is expected that development of better materials and processes would give video tapes that will give resolution comparable to films.

Video-tape like audio tape can be used for recording and re-recording by washing earlier impressions. The tape can be played again and again for multiple use.

Video-casettes and V.C.R. are becoming popular entertainment equipment and are spreading very fast. The spread of Television is now followed by the spread of VCR and video-casettes. Video-casettes, VCR and TV offer us non-broadcasting and convenient mode of seeing programmes.

However, video suffers from two major drawbacks. Any scene or a sequence on a tape can be seen only by moving tape forward or backward. One cannot reach the scene instantaneously as in the case of computer magnetic discs or tapes. Secondly, repeated use of the video tape reduces the life of the tape. Thus the tape has a limited life.

Both these defects have been eliminated in the video-disc technology. Videodisc is of the size of a long playing record of plastic material on which the pictures and sound are recorded. The video disc is played on videodisc player in which laser beam or light beam works as a 'needle' which can reach any frame in any cyclic groove practically instantaneously. Since the contact between the disc and player is through light (laser) beam, the life of the disc is practically infinite. The videodisc, however, suffers from one drawback in making recordings. They cannot be made by the user as in video-tape. Further, once the disc is prepared, the impressions are permanent like the usual audio records.

Video-casettes offer an excellent medium for preparing programmes that can be broadcast through TV channels or can be multiplied and circulated for wider use, the non-broadcast way.

Videodisc with micro-processor controlled videodisc player and

TV becomes a very versatile educational medium for interactive learning due to easy and quick accessibility to any part of the disc. The disc has also great storage capacity. On one side, it can store about 57000 frames for material of about 1600 books, each of 300 pages.

SATELLITE

India has launched its geo-centric satellite INSAT_1B for communication and meteorology observations. A programme of establishing 180 (on Nov. 14, 1984, 164th low power transmitter has been installed) low power transmitter is going on in full swing and by the end of 1984, it is expected that nearly 70% area and population of India will be able to receive the TV transmission. In September, 1984, second channel has started from Delhi. The television network getting established in India having nearly 70-80 percent population in rural areas and about 60% masses illiterate, the satellite and TV network offers powerful medium for dissemination of knowledge, cultural programmes and developmental information, which otherwise remains restricted to educated and urban populace. This would no doubt reduce the disparities between urban and rural as well as literate and illiterates. Launching of satellite for communication is an excellent step taken by India having great futuristic impact. India has planned to launch series of satellite·mainly for broadcast and communications, weather and agricultural observations, geographical and geological explorations.

Besides television network, satellite is an excellent device for communication and can contain a few thousand communication channels. Advantages of satellite communications are; wide area is covered without any loss of quality in the message sent, the communication channels are not affected by natural calamities as is usually the case with telephone wires. The cost of telephone network through telephone cables is extremely high and increases when larger area is covered. Besides being expensive due to material cost of cable wires, the maintenance cost of telephone cable net-work,even through micro-waves network, is quite high. A net-work of communication through satellite is easy andfar more economical to construct, since it uses wireles beams and the maintenance costs are far less and almost equal for any distance.

INFORMATION COMMUNICATION NET-WORKING

Technology is changing in its versatile nature and range of application so fast that those involved in the development cannot clearly predict what is in store after a decade or two. Fifth generation computers as 'intelligent' and 'smart' machines are in the stage of development and·may be available within a decade or so.

Microprocessors are entering in every area of activity. In fact some of the advanced countries like Japan, U.S.A., poised for transition into post-industrial or Alvin Toefler's 'third wave' society. Whatever might be the changes brought about, the new technologies have the following general features:

(a) Economical: micro-miniaturization has reduced size and automated factories have increased production resulting in lesser costs.

(b) Versatile: range of applications is fast widening and the technology is becoming reliable and 'user friendly'.

(c) Wider accessibility: reduced cost and versatile nature is finding the easy acceptability and wider use by common man.

(d) Decentralised nature: new technologies are creating wider information base to which contribution comes from wide variety of segments of society. Through closely linked and easily communicative technologies, individuals or groups can fulfill their distinctive information requirements. Thus many creative and innovative users get freedom to develop and communicate their soft-ware. Instead of uniformity, this technology is capable of promoting diversity and would suit a country like India with linguistic and cultural variety.

Knowledge forms basis for development. To give better opportunities for development is to give necessary information to an individual or group required for development. Hence creation of knowledge or information and to make it accessible to all is the basic objective of the 'Information Communication Net-Work'. On the basis of existing technologies, let us see how the Net-working could be done. We would also consider the effect of net-working on society in general and education in particular.

NET-WORK: The net-work essentially consists of electronic storage of information in audio, visual and text form linked with and received through cable or through wireless-transmission.

At the receiving end i.e. at home or community centre or institution, minimum equipment required is Television (TV), Video Casette Recorder (VCR) and Home or personal computer. The devices are linked to the information storage through cable or telephone wire for non-broadcast link. For access to more information, video disc player with access to video disc library would be essential.

Wider utilization of the net-work depends on the storage of information that fulfills cultural, educational, professional, commercial, economic and social and individual or groups. Such information like news, market information, entertainment, tranport information, educational and professional information etc. has to be stored in communicable form at various centres linked with the communication net. Such networks would get created more with commercial motives, and they have already been established in many countries. Specialised net-work for educational purposes linking selected institutions, community centres etc could be established as micro.nets for information communication.

In the networking, it should be realised that commercial and market forces would dominate and exploit it for its benefits. For example some cable TV network in USA has recently posed a problem whether blue films be shown on the network or not. Inspite of individual dislikes, there are many who would pay for such entertainment and commercial approach to net-work would not lose such an opportunity of exploitation. The net-work brings to your home all knowledge and entertainment, but the undesired aspect has to be controlled right from the beginning. Infact social and institutional screening and censorship of information has to be established before it is allowed to be entered into the communication net-work.

Changes

Establishment of the information communication net-work would certainly change attitudes and the way of functioning of individuals and institutions. Following broad changes are envisaged:

(i) At present information or knowledge is created at a few selected well established places. Once the net-work is established, the creation of information, particularly of social, cultural, economic and technological aspects would be created anywhere in the nation. Thus creating decentralization and losing the monopolistic hold of the few existing establishments.

(ii) Net-work makes information available to any one at any place having receiver facilities. This creates omnipresence of information

(iii) At present the information is distributed through newspapers, library books, TV etc. With the information net work having fast computer processing capacity, a receiver can select his own information and call for it. Thus distributive process would give way to the selective process. This would give an opportunity to individuals and groups to retain their selective identity and to pursue their interests.

The mass media in such a situation get de-massified. At present information is a privilege of a few, but the net-work would make it available to many or all.

(iv) The process of distribution of information through newspapers, books etc. is through commuters. This would change in the network with electronic recording of all information which would be exchanged through telecommutation.

(v) With such an omnipotent information base difference between rural-urban, literate-illiterate, elite-non-elite etc. is likely to be reduced substantially. At producers and consumers of information are different creating the disparities. Once, the disparities are reduced, the distinction between producer and consumer will be blurred and a new society of prosumers would get established. The society would not be commercial but informercial.

(vi) The new-technologies are creating automated factories, offices, markets, banks by increasing quality, efficiency and productivity. At the same time man is spared of all the routine repetitive operations creating a situation of affluence without much of work.

Further, the information communication net-works would be created at the national level and could be integrated to form international net-work. To live and prosper in such a situation, would need different attitudes approach and education.

The future generation has to be, therefore nurtured and educated with internationalism, cooperative and collective living, and liking for creative arts and crafts with high emphasis of social-science and humanistic education.

(vi) The new technology which is bringing about these changes, is not created of revolutionary scientific and technological discoveries. The basic principles governing these technologies are known for quite a long time. However, the technology is percolating at a high speed and altering the nature of our production and distribution processes and changing the way of our living and working.

Industrialization based on scientific and technological development needed nearly three centuries to transform society from agricultural to industrial nature. The new technologies are likely to bring about far more changes within three decades.

Evolutionary process in which man adjusts to the changes might not be available with the changes by new-technologies. These changes are therefore, going to be revolutionary and the socio-cultural, economic, psychological problems faced by the societies undergoing changes needs to be studied carefully.

> Main task before the educational system would be preparing the younger generations that would live with world-wide information leisure and prosperity.

IMPACT ON UNIVERSITIES

Universities carry out mainly three functions: research, teaching and extension. Creation and preservation of knowledge and their dissemination to students and society are well-accepted functions of Universities. The functions are usually carried out by establishing educational institutions for full-time formal education.

The education has been recognised as the needs of all for the development and University education is being diversified through non-formal channels and extension activities to reach larger and wider sections of society. In fact high enrolment has created unsettling effect on the Indian Universities. Higher education is slowly changing from its nature of class education to mass education. The future society undergoing rapid tranformation, will require imparting knowledge and training of skills practically to everyone to enable him to develop and progress. The society would be a learning society and knowledge or information would prove to be the wealth and power for efficient and quick development.

The process of teaching-learning has essentially three components - viz. transmission of knowledge, imparting skills and formation and cultivation of attitudes, approaches and values. With the availability of new technologies of computers and communications, transmission of information may cease to be the main function of a teacher. Partly skills could also be taught through AV-media. However, role of a teacher as a demonstrator of skills and cultivator of values and attitudes would remain forever and would acquire prominence.

Full-time formal education is not the right way for larger enrolment of students. Further, the requirements of knowledge and skills of masses would need diversified channels of short and long term courses of vocational, professional and cultural education. Information Communication Network can be effectively used to educate large number of aspiring students. This will require exploiting potential of new technologies and developing distance education technology. Open Universities already establshed in many parts of the world are the right steps to develop different courses, methods of teaching and evaluation suited for large number scattered all over the region that University serves.

When the educational courses are prepared by the best experts in the subjects and educationists, these would help in learning the subjects through self-study, in colleges and Universities, the role of a teacher would then be changed. He would have to function as a tutor helping the student to understand and master the contents. As an expert in the subject and educator, he can participate in preparing the course-ware on differnt distance media. Within a decade or two the nature of teaching and learning is likely to change substantially. Nationwide class-room is already getting created and when the educational software becomes available through non-broadcast channel, every home or a centre having media facilities would become a centre of learning. Teaching and Learning would not be concentrated in the colleges and universities but would get diffused in the society, though the role of the college and university as a centre of knowledge and expertise would continue. Nonformal channels of education through modular short term courses satisfying needs and requirements of various groups of learners would be dominating feature of the educational institutions. Since the demand for new knowledge and skills is going to grow with rapid changes, the role of the educational institutions have to be widened in types of courses and contents to suit the diversity. This would need pooling resources and expertise from the society. In this process the universities and colleges would lose their exclusive hold as the educational centres but wOuld have to open out to work centres for coordinating and monitoring the educational facilities and opportunities. The universities cannot afford to remain closed institutions but have to open out.

The process of opening out of the conventional universities has already started with extension activities, continuing and distance education becoming important functions of the university.

EXPERIENCES IN THE USE OF MODERN TECHNOLOGIES

In order to solicit information from various agencies involved in one way or the other with applications of the new technologies in higher education, a questionnaire was put together and the responses received to this questionnaire from various agencies are summarised below. Appendix 'II' gives the questionnaire used in this context.

EXPERIENCES FROM INDIA

UNIVERSITY GRANTS COMMISSION, NEW DELHI:

UGC Plans for utilisation of INSAT-1B for Higher Education

It is a recognised fact that the main purpose of any educational effort at higher education level is to raise the quality and standard of teaching and learning in the universities and colleges. Introduction of Mass Communication and Educational Technology can play a vital role in incrasing the professional competence, capability and communication skills of the teacher who is the pivot of the teaching-learning process. In the present context of non-formal education, educational technology will be a very useful tool in the programmes of adult and continuing education and extension and correspondence courses as also in the restructuring of courses of study at the University stage. In view of this, the Commission gives importance for the introduction of Mass Communication and Educational Technology in the university system on a priority basis. During the sixth plan period the University Grants Commission has made a provision of Rs.200 lakhs for assisting the universities on selective basis for mass communication and educational technology programme.

In a meeting held in the Ministry of Education in February 1982 where a representative of the Ministry of Information and Broadcasting was also present, it was indicated inter-alia that when INSAT will become operational it will be possible to ensure transmission time of one hour everyday in the afternoon on programmes of higher education. Following this the UGC constituted a working group to advise it on various matters connected with the setting up of Centres of Mass Communication and Educational Technology in Indian Universities. On the recommendations of the Working Group a Task Force was appointed in August 1982 to prepare a Plan of Action. The recommendations of the Task Force were considered by the working group on June 1, 1983. The final recommendations of the working group were considered and accepted by the Commission at its meeting held on 23rd July, 1983.

The Task Force has recommended three levels of educational media centres in the universities. The frame work consists of:

i) Audio-Visual Research Centres (AVRC) in a large number of universities to orient the faculty to innovate and take up research in educational technology and to the use of educational media.

ii) Educational Media Research Centres (EMRC) to be set up at universities that have gained some experience or shown initiative in the use of audio-visual media (Essentially for production and utilisation) combined with innovation and research in educational technology.

iii) National Centre for Educational Media in Universities (NCEMU) to be set up to co-osrdinate and facilitate the functioning of EMRCs and AVRCs and to assist in procurement, duplication and distribution of Audio-Visual material.

The activities of an AVRC would be:

(a) To set up and operate an Audio Visual Library;

(b) To organise basic orientation courses for the university faculty in the use and production of Audio-Visual material on an innovative basis;

(c) To act as a facility for the journalism and mass communication department and the departments involved in extension activity project;

(d) To develop capabilities for generating Audio-Visual material;

(e) To undertake research in all aspects of educational technology, in relation to learning in diverse age groups, urban rural population and disciplines.

The EMRC would carry out all the activities of the AVRC. Besides this it would generate Audio-visual educational package which could be used by other universities and INSAT transmission. The EMRC having editing and studio facilities woud enable the university to produce finished educational material, educational package that could be used as a part of the format syllabus.

The country has now a satellite which can relay T.V. Programmes which can be viewed in all parts of the country particularly with the help of Low Power Local Transmsitters which are being installed in all towns-even towns with population of 100 thousands. The considerable expenditure on the Satellite, which will be used for many other purposes, has been to a large extent justified because of what educational benefits we can reap with its help. In principle, everyone desirous of receiving an educational programme can do so through community viewing. On this facility the whole country can be unified by some common educational thrusts and at the same time each region can be served according to its needs. There are exciting possibilities of class room situations, seminars or tutorial sessions to be beamed, vocational and technical courses requiring a great deal of visuals to be conducted and programmes for teachers' further education taken up without their having to leave their institutions. The programmes and facilities could form the core of a University of distance education which has been recommended to Government from various forums.

The present position is that our college and university teachers who are to play a crucial role in producing suitable programmes have no acquaintance with the new TV or Radio medium and in the University system there are very limited facilities available for doing so. Therefore, a small but carefully planned, beginning has to be made with provision for monitoring and evaluation so as to continuously expand and improve the programmes.

The University Grants Commission as an agency concerned with all universities and colleges and particularly responsible for maintenance of quality and standards has naturally taken the initiative. One hour transmission time has been assigned to higher education in the INSAT-1B Satellite Programmes. The Commission has decided to set up training and production facilities with standard equipment in the selected six Centres, namely Mass Communication Research Centre, Jamia Millia Islamia, New Delhi; Educational Media Research Centres (EMRCs) at Poona University, Gujarat University and CIEFL,Hyderabad and Audio-Visual Research Centres (AVRCs) at Osmania and Roorkee Unversities. A Central Programme Committee has been set up to coordinate and channelize suitable material for daily telecast to Doordarshan.

It has been decided to make what are called enrichment programmes at the undergraduate level. Topics in different disciplines are being chosen so that the largest number of students and indeed any educated person may benefit. Some topics will relate to National development and National concerns such as Agricultural or Industrial visions, achievements, shortcomings, future perspectives or National integration, secularism and socialism which are a part of our constitution. These subjects will receive scholarly attention will help give breadth of knowledge and awareness to the viewers. There will be special programmes for teachers in higher education to enable them to handle their class and examination work better, to give them upto date knowledge and particularly to make them familiar with educational goals of their profession. Some selected world class educational TV programmes are also being procured because of their excellence and in many cases the thrill of learning which distinguished makers of these programmes, can bring to our student community.

Since the programmes to be produced by the university sector will only be in small number initially, it is desirable to select suitable material from that which is either commercially available or available on loan basis from universities or other Institutions in India or abroad. For this purpose a Cell/Unit has been set up in Jamia Millia Islamia to examine the commercial or non-commercial available video-tapes, audio-tapes and films for the purpose of determining the suitability for being televised through INSAT-1B.

However, this may be only a short-term plan and for a long-term plan the University Grants Commission would like to have a proper idea about the audience profile, their entry behaviour and skills, their understanding the English Language, their needs etc. The University Grants Commission would also intend to pre-test the programmes which it is getting prepared. For this purpose the Commission has set up a Research Advisory Committee for INSAT Television Programmes for Higher Education.

A team of Experts may visit U.K. shortly, to screen and select software for use in the Higher Education sector through INSAT-1B. Since most of the foreign programmes that are being selected would be of good quality programmes in Science and therefore there is a greater need to produce good quality programmes in Humanities and Social Sciences as well. In view of this a meeting of some Experts in Social Sciences was convened in connection with the enrichment of undergraduate programmes of study in Social Sciences through the national TV Network and to identify topics from the various subjects in social science with which 15-20 minutes programmes may be made. Topics are being selected from the point of view of presenting a broader picture that what usually is done in a course on the subject in a college or university. The topics are also being selected from the point of view of their significance particularly for nation building or for their sensitive nature.

By the middle of July 1984 programmes on Higher Education will be telecast in an experimental mode with colleges provided part assistance in buying receiver sets. It is expected that the TV programmes will be supported by other learning material and that its impact will be felt throughout the country and in performance of all visits to new creative activities by the teachers in colleges and universities. Those who have been constrained by chalk and talk can now learn to present their subjects with the new medium in a much broader frame to much larger audiences.

The entire programme will be watched and evaluated so as to improve it and cast it in a higher mode during the 7th plan. The Task force, set up by the Working Group to advise the commission with regard to setting up of Centres of Mass Communication Studies and to indicate the priorities for various categories of programmes for higher education, their content, the language and other details, recommended inter-alia setting up of a National Centre for Educational Media in Universities (NCEMU), few educational Media Research Centres and several Audio-visual Research Centres. The working group recommended the NCEMU suggested by the Task Force may not be set up immediately and it may be taken up in the next plan i.e. VII plan. During the 7th plan period, it is proposed to set up 8 more Mass Communication and Educational Technology Research Centres including the National Centres for Educational Media in Universities (NCEMU). An outlay of Rs. 20 crores has been proposed in the VIIth plan for the purpose, in addition to Rs. 1 crore for the development and production of educational material and audio-visual aids.

The programmes that UGC talks of above have started being telecast from 15th Aug. 1984. Besides, the centres set up by it (EMRCs and AVRCs) have started functioning. A brief report on the functioning received from the centres follows:

Mass Communication Research Centre, Jamia Millia Islamia, New Delhi.

The objectives of the Centre are:

i to run an M.A. course in Mass Communication including training in radio, television, film and audio-visual production.

ii) to use surplus capacity of staff and hardware to make educational and developmental programmes for the public network.

iii) to use surplus capacity to provide short-term training to academics and personnel of autonomous bodies.

iv) research in programme formats and audience feed back.

The main activity of the Centre is teaching. Also, at present making educational programmes of undergraduate level for university hour on the satellite. It also helps IIT Delhi with curriculum development, in developing video programmes and recording.

The Centre uses/recommends to use video technology like video cassettes for subject matter enrichment, video cassete recorder video cameras and video tapes. Video cassettes have been used for education and enrichment programmes. The Centre also uses/recommends to use video software for Teaching learning as non print teaching material. It is making such programmes.

The centre uses/recommends to use programme for broadcast through satellites, INSAT-1B and future Insat satellites. It proposes to undertake research studies, investigations into applications of new technologies in higher education and is waiting for television sets to be installed in colleges named by the UGC in UP, Haryana, Punjab, Madhya Pradesh. It will organise feed back of programmes broadcast for university hours on the satellite. It also proposes to make feed back studies.

Educational Media Research Centre, University of Poona:

The objectives of the Centre are to produce educational programmes for telecast via INSAT-1B. The level is undergraduate and the purpose is more enrichment and creation of awareness amongst students and the general educated public. Subsequently with more time becoming available, the Centre feels programmes could also be made relevant to certain specialized courses in the undergraduate syllabus.

This Centre has taken part in the planning of the Educational Media Research Centres in the universities regarding involvement with regard to higher education, the EMRC will conduct:

i. Programme making
ii. Teaching college teachers
iii. Teaching colleges students in software development.

It will also monitor and evaluate its own programmes.

The new technologies introduced/implemented in the Centre are micro-computers (partly in some institutions) micro-processors, still picture television, communication satellite, video discs (just about to start).

The computers used by the Centre are main frame (ICL 1904 S), minicomputers (ICL 101) and minicomputers (ETCC I IBM PCs). Every year computer awareness (literacy) courses are run lading to degrees B.Sc., B.Sc. (App.) certificate.

The centre has plans to start computer assisted instruction computer managed instruction including test construction and marking/analysis, computer based teacher support (Central Cataloguing/data base) once Department of Computer Science starts functioning.

The Centre uses/recommends to use video technology like video cassettes for subject matter/enrichment, video cassette recorder, video cameras, video discs (in the university only not for colleges) and video tapes.

240 Teachers from colleges have been trained in the production of software for teaching/learning in their own subjects of specialisation. The duplication and distribution of video cassettes is gradually being done. Video cassettes/tapes have been used for education and enrichment programmes.

Equipment is ordered for interactive packages like micro-processor computer for storage and retrieval of information, processing of data and video technology. The course will be run in this centre.

The Centre has been producing programmes for telecast via INSAT-1B w.e.f. 15.7.84. There is also a research Unit working in this Centre to assess the needs, production of programmes to satisfy the needs and to do monitoring and evaluation of the programmes for improvement.

Besides using the above new technologies audio tapes are produced by the Centre.

The centre trains/proposes to train teachers, communication experts, production assistants and maintenance personnel for hardware operation and software development and use its information from the user. The centre feels that resistance to use these new technologies is not for the basic principle but because of shortage of funds.

Department of Physics, University of Poona:

The responsibilities/involvement of the department with regard to higher education includes: Planning: teaching at UG and PG level and R and D in Materials, Space, Plasma and electronics: Conduct: training programmes and research activities: Monitoring: UG and PG Physics teaching; and Evaluation of students, course work on a regular basis. Microcomputers and Microprocessors are two new technologies introduced by the department in higher education. The University uses mainframe and microcomputer. It is presently working on CAL at UG level and its first programmes would be ready in one year's time. It is planning to use post graduate students for such a work from 1985. It also plans to conduct computer awareness (Literacy) courses.

The department runs courses in computer languages. Regarding the use of video technology, it is working on physics programmes at its EMRC (Two such programmes would be ready by August, 1984). The department uses/recommends to use video software for teaching learning, as non-print teaching material.

The department makes programmes for INSAT-1B. As regards undertaking research studies/investigations into applications of new technologies in higher education, the department is establishing a research link with Education Technology Centre with Irvine University of California USA.

The department proposes to arrange training programmes for teachers in software development and software use.

Osmania University, Hyderabad:

The University conducts computer awareness (Literacy) course primarily for students and faculty. Educational computing has been used for computer assisted learning through learning programming languages, Tutorial problem solving and computer assisted instruction for various disciplines in the faculties of engineering, sciences and social sciences. Besides, computer is used for computer managed instruction for marking analysis and courseware (educational support material) for programming language and programme documentation.

The University has use of video technology like video cassettes for subject matter/enrichment, video cassette recorder, video cameras, and video tapes. It has also recommended to use video software for Teaching/Learning as non-print teaching material. The university uses microprocessor computer for storage and retrieval of information and processing of data. It has recommended to use programme for broadcast through satellites, Insat-1B and future Insat satellites. The university proposes to undertake research studies, investigations into applications of new technologies in higher education.

The University trains/proposes to train teachers, communication experts and production assistants for software development and software use. It also obtains/proposes to obtain systematic feedback information from the users. Any resistance experienced by the University in use of these new techniques is felt to be primarily due to inadequate resources and unwillingness to commit time to projects that do not have the even chance for successful fulfilment. It is hoped by the university that funding agencies such as UGC will come forward with commitment of adequate resources in a phased manner.

University of Roorkee, Roorkee:

The University has introduced new technologies like Micro-computer Micro-processors, still picture television (there is a TV, Engineering course), communication satellite (satellite communication is taught as a subject). An audio visual centre at university has been sanctioned and with this the university intends to use the video disc-facility also, like production of video software for teaching/learning, as non-print teaching material.

The University uses main frame, mini computers and micro-computers. Every department is teaching computer programming courses to students. Educational computing has been used for computer assisted learning and tutorial/problem solving. The students are assigned problems to be solved on the mainframe DEC 2050. Special laboratory sessions are held for classes whenever needed. Students are assigned specific work to be done on computer. Educational computing is also done for preparing courseware (educational support material) like programming languages, programming documentation lesson plans curriculum design and supplementary resource material.

The University uses/recommends to use interactive packages like microprocessor computer for storage and retrieval of information, and processing of data. Given an opportunity and facilities, the university may use programmes for broadcast through satellites, INSAT-1B and future INSAT Satellites. The University also proposes to undertake research studies, investigations into scale use of computer facilities and increasing its efforts in CAD/CAM, Graphics, Real Time processing.

The University trains/proposes to train personnel like teachers, communication experts, production assistants for hardware operation, software decelopment and software use. It has a regular means of getting feedback from its students.

DOORDARSHAN DIRECTORATE, NEW DELHI:

The main objective of the Directorate is dissemination of Television Programmes of educative, informative and entertainment value and broad activities are meeting the software requirements of procuring programmes in Doordarshan complexes and arranging programmes from other agencies, installing and maintenance of hardware for TV programme production and telecasting through satellite links. Its responsibilities/involvement with regard to higher education are planning of hardware for educational television and monitoring the overall performance. The new technologies introduced/implemented are video cassettes and communication satellite. The Directorate uses video cassettes for subject matter/enrichment, video cassette recorder, video cameras and video tapes. Video software for teaching learning as non-print teaching material is used for school TV broadcast and non formal education are presented in the vedeo medium. video dubbing through cassette recorders and distribution up linking through INSAT-1B is resorted to for dissemination of information. Video cassettes (3/4") VHS and tapes (1") are used for education programme/enrichment programmes.

The Directorate uses INSAT-1B for education and area specific programme mainly for rural audience. Interaction is carried through the viewers feed back received mostly by letters. There is an audience research unit to go into the details of viewers' reaction. If new technologies in higher education are introduced by the user agencies the Audience Research Unit of Doordarshan may analyse the viewers' reaction.

The Directorate uses only audio visual method for teaching. It trains/proposes to train communication experts, production assistants and maintenance personnel in hardware operation and maintenance, software development and software operation and maintenance, software development and software use. It obtains/proposes to obtain systematic feed back information from the users.

The Directorate has not experienced any resistance in the use of new techniques since using new techniques is part of the development the department undertakes to uplift its performance.

DEPARTMENT OF ELECTRONICS

It is reliably learnt from the project proposals of the Department of Electronics that computers and videos are likely to be made available to a large number of schools and colleges. Already the initial exercise of providing a microsprocessor computer to select 250 schools all over the country has been completed with clear cut instructions that students from IX to XII standards should be trained to use these computers the same way they are using a telephone. Several training programmes for teachers of these schools have been conducted and the scheme has been implemented in the schools. The recent proposal of the Department of Electronics to implement computer literacy programmes for students of standards IX and X and computer vocational courses and computer programming courses for students of standards XI and XII is commendable since this will meet the projected manpower requirements of low level computer professionals (estimated to be around 16,000 at the minimum). In addition it is also proposed by them to select colleges where the support for running Diploma in Computer Applications (one year duration), Master of Computer Applications (3 year course), to meet progressively manpower requirements of computer scientists (6,000 to 19,000) and second line computer personnel (11,000 to 14,000).

In its planning, the Department of Electronics has proposed to cover 1000 schools in the first year followed by 3000 and 6000 schools in subsequent years.

As a part of Educational Community Video Project, 'Teleteach', Electronic Trade and technology Development Corporation has announced an ambitious scheme of manufacturing half a million video cassette recorders and give the first batch of these VCS to the Govt. and other social organisations for the 'teleteach' programme.

The software for these VCS will include not only the already available material at the software development centres established by the Government but also new video cassettes and discs will be produced consisting of well researched material on 'why' and 'how' to improve the skills of many a craftsmen belonging to different professions including utility management employees. The software developed will also include programmes on community development and motivation like child care, personal hygiene, handling accidents, etc. This, it is felt, will bring in quality and serve to improve skills for those people who have had no chance of formal education.

MINISTRY OF EDUCATION

At present, India has 165 TV transmitters in operation. These include 20 low-power (100 W) TV transmitters operationalised in November 1982 for expansion of TV coverage for ASIAD-82. All of the low-power transmitters are presently totally dependant on satellite TV feed for their operation. Following loss of INSAT-1A, these were being fed by C-band TVROs operating with transponder leased from the Soviet Union on board their statsionar-6 satellite and TV uplink from ISRO Earth Station at Delhi. With the oprationalisation of INSAT-1B, 36 TV transmitters dependent on satellite feed for all or part of their transmissions have already switched over to INSAT-1B. Currently, in addition to the two high-power S-band transponders onboard INSAT-1B specifically meant for TV, Doordarshan are also using, in the current transition phase, a C-band transponder for TV programme distribution.

Under the INSAT-1 TV utilisation scheme (July 1981), about 800 Direct Reception Sets (DRS) have been deployed in Andhra Pradesh and Orissa; some 600 of these are in operation and the remainder are being progressively operationalised. Another 1200 DRS will be deployed in Insat-1B DRS states by August 1984. Of the four high-power transmitters included in the INSAT-1 TV Utilisation scheme (July 1981), Nagpur is already in operation and the transmitters at Gorakhpur, Rajkot and Ranchi are expected to be operational before March 1985. 135 VHF TV community viewing sets have been installed in the service area of Nagpur TV transmitter. The remaining 1850 VHF TV community viewing sets will be deployed in the INSAT-1 scheme areas during the 6th plan period. In the initial period, the two channel TV uplinking capability is limited to Delhi.

The Ministry of Education have a programme for utilisation of INSAT TV for school and adult education and for teacher improvement. The University Grants Commission (UGC) are implementing a scheme for use of INSAT TV for higher education in Universities and affiliated colleges. Currently, school education ETV programmes via INSAT are being telecast five days a week in selected districts of Andhra Pradesh, Orissa and Maharashtra -- a total duration of about 45 minutes per day and one programme each for the age groups of 5-8 years and 9-11 years. On every Saturday, there is is programme for teachers. This service will be progressively introduced in other INSAT-1 TV states. Currently, the programme production for ETV is shared between Doordarshan and the Central Institute of Educatinal Technology (CIET) of the National Council for Educational Research and Training (NCERT). NCERT is enlarging CIET TV programme production facilities and the Ministry of Education have sponsored development of State Institutes of Educational Technology (SIET) in the six INSAT-1 TV states for taking over much of the ETV programme production responsibilities in the long run.

A scheme for TV service availability to Jawans in forward areas using reception of INSAT-1 TV transmissions by Direct Reception Sets (DRSs) is also under development.

The S-band DRS technology has been developed by ISRO and the technology has been transferred to ECIL, KELTRON and GCEL. The orders for the initial lot of 800 DRSs were placed by Ministry of Information & Broadcasting on ECIL. Orders for the remaining 1200 DRSs to be deployed before the end of the 6th Plan have been placed with KELTRON and ECIL. The Bharat Electronics Limited (BEL) have already supplied 32 units of S-band TV Receive Only (TVRO) terminals ordered for them by I & B Ministry/DD. The design and development of S-band TVROs has been carried out by BEL itself. The orders for the S-band TVROs required for the Special TV Expansion plan (July 1983) are divided among BEL and ECIL.

The P & T Department have provided the two channel TV uplinking capability from their Delhi Earth Station and Studio to Earth Station end-link connections. SAC/ISRO have provided TV uplinking equipment to P&T and another 2 units in 1+1 configurations with higher environmental specifications are due in January 1984. The 6m diameter P&T Transportable Terminal (TRACT) is equipped for TV uplinking capability. The experimental TRACT of ISRO is also equipped with Doorsarshan's interim use of a C-band transponder is furnished by ISRO's experimental Earth Station at New Delhi, which also supported uplinking with Statsionar-6 leased transponder during March-December 1983.

The Government has plans for replenishment of the first-generation INSAT-1 spacecraft procured form abroad during the time-frame when the INSAT-1B spacecraft is expected to require replacement i.e., in 1990-91 and onwards. The *Space Research & Development Profile for the Decade 1980-1990*, approved by the Government, provides for design, fabrication and launch of the secondgeneration INSAT (INSAT-2) *test* spacecraft; the current time-line for the launch of the first of these test spacecraft is late 1988. The baseline definition of the functional requirements for the INSAT-2 spacecraft has advanced considerably in cooperation with the agencies participating in the INSAT system, namely Posts & Telegraphs Department, the Indian Meteorological Department, the All India Radio and Doordarshan. The INSAT-2 test satellite programme definition is expected to be completed by mid-1984. It is to be noted that APPLE, the Indian Experimental Communications Technology Satellite, launched in June 1981 and located at 102° East longitude, was the first major step in the direction of developing indigenous capability for design, development, fabrication, qualification and testing, and mission management (including orbit raising and other manoeuvsres).

For overall management of the INSAT System, Government has constituted the INSAT Coordination Committee (ICC) consisting of Secretaries of the Ministries/Departments of Communications, Economic Affairs, Information and Broadcasting, Space and Civil

Aviation with Secretary, Department of Space as its Chairman. The key functions of the Committee are (i) coordination and monitoring of the implementation of the project, both space-and ground-segments, to ensure efficient and timely execution (ii) coordination at the operational stage, with a view to achieve maximum efficiency and utilisation, (iii) planning future developments, and (iv) consideration of problems relating to orbit-frequency coordination of the INSAT System. The Wireless Adviser to the Government of India is an invitee to the meetings of the Committee on matters concerning frequency/orbit coordination. Programme Director, INSAT is the Secretary of the Committee.

The INSAT Programme Office (IPO) headed by the Programme Director, INSAT, in the Department of Space services the Committee and its Technical Advisory Group (TAG). The Technical Advisory Group (TAG) of the Committee consists of the Wireless Adviser to the Government of India, Programme Director, INSAT, Deputy Director General (Satellite)/P&T Board, Additional Director (SP), TRC/P&T Board, Director General of Meteorology, IMD, Director (Satellite Meteorology), IMD, Engineer-in-Chief, All India Radio, Chief Egnineer, Doordarshan, Project Director, INSTAT-1 Space-Segment/DOS and Head, Communications Systems Division (CSD), SAC/ISRO. Study Director, Proto-INSAT, Manager MCF/Convenor of TAG's Standing Sub-Group on INSAT-1 Operations Coordination, Deputy Wireless Adviser to GOI, Chief Engineer (Ops. & Maint.), AIR , Director (Engg. - INSAT), Doordarshan, et al are also affiliated with TAG deliberations as Alternate Members. Programme Director, INSAT is the Convenor of TAG. The INSAT System frequency/orbit coordination matters are handled by the Wireless Planning and Coordination (EPC) Wing of the Ministry of Communications.

EXPERIENCES FROM OTHER COUNTRIES

It is imperative that advances in communication technology have a desired effect on educational systems particularly higher education in a country. Storage, retrieval and communication of information is crucial in development particularly when education spreads itself to masses. It is in this context that new emerging technologies in both the fields of information and communication are to be seen to help educational system to be more effective and to realise all its multifold objectives. In recent years, the technologies of micro-electronics and communications have led to a proliferation of such gadgets as micro computers, video tapes and discs, electronic data network etc. Inspite of the fact that in U.K. the possibilities of these gadgets are viewed with some doubt, over the last decade or so, the range of use of such gadgets has expanded rapidly.

Microprocessor computer is used in a wide variety of ways, some of which are, as supercalculator, as a direct aid to the teaching/learning process, as a Data-Base, in an Administrative or Managerial Role, to teach about computer programming.

In New Zealand, micro cimputers are used in schools for a range of functions. It is replacing the traditional typewriter for typing classes, accounting and other subjects. In every school with a strength of 1000 students there are already available three sets of ten micro computers, one set in geography, one set in typing and one in the computing departments.

In Malaysia, computers are already in use for data storage and retrieval. Computer clubs in various schools to spread awareness of computers and using them as tools of access to information are growing.

Video technology has demonstrated its merits when coupled with the rapidly growing micro-computer technology. It has made it possible to provide immediate feed back and also to store data on student performance. Thus the advantages of the two can be exploited. By integrating computers worth other audio visual hardware, the resulting system can provide a flexible means of interactive communication which can be suited to the needs of specific learners and make learning most effective. New Zealand is using video technology for micro teaching; Japanese schools have a very high penetration of this equipment; Australia is using educational technology increasingly through the use of video-cassetts; in Malaysia all schools are provided with a TV set and video cassettes recorder; many video programmes are integrated into the teaching learning process from tertiary to primary education.

There has been no UK experiment in the use of satellites in education. There have however been several experiments around the world which have been reviewed by Daniel. These are:

(ATS:Application Technology Satellites
CTS:Canadian Communication Technology Satellite)

1. ETV broadcasting to groups (India, Satellite Instructional Television Experiment)

2. ETV broadcasting to groups with audio return (eg. ATS-6 Applachia and Rocky Mountain Projects)

3. Multiple audio-conferencing (eg. the Peacesat experiment with ATS-6)

4. Tele-lecturing either with bi-directional video or one way video with audio return (eg. the Carleton/Stanford curriculum exchange on CTS)

5. Research seminars with one way video to several points with audio return (eg. CTS electron microscopy experiment)

6. Library consultation (both video and audio) and document transmission (eg. Quebec CTS Project)

7. Linking cable TV stations for live interaction between communities (eg. Quebec CTS)

8. Multi-point video conferencing (eg. CTS experiment by Canadian Public Service Commission)

9. Various types of computer communications and conferencing (eg. Peacesat)

10. Transmission of videodocuments for storage and later use (eg. Symphonie France/Ivory Coast)

11. Interactive 2 and 3 point video conferences (eg. Symphonie France/Ivory Coast)

FUTURE PERSPECTIVES

EDUCATIONAL TECHNOLOGY:

To many people, the term 'educational technology' is associated solely with the technical equipment and media of education - such as overhead projectors, television, tape-slide programmes, interactive video, computers etc. Others take the view that educational technology involves a clinical, systematic analysis of the entire teaching/learning process in an attempt to maximise its effectiveness. Largely because of this confusion over its meaning, there can be little doubt that educational technology has now become a rather unhelpful jargon expression. Indeed, many practitioners working in the field appear to be rather embarassed by it, and in some cases, have even made an attempt to disown it. Several former 'educational technology units' in colleges have, for example, recently been re-named as 'educational development units', 'learning units' or something similar. Although in the subsequent years several changes and additions have been made to the concept of educational technology and a more sober realisation developed of what it can achieve, the major assumptions behind its use have generally remained unchanged all over the world. However it is becoming increasingly common now to distinguish between 'technology in education' and 'technology of education'.

Technology of Education:

It was argued that the principal role of educational technology was to help improve the overall efficiency of the teaching/learning process. In education and training improved efficiency can manifest itself in many ways, for example:

1. increasing the quality of learning, or the degree of mastery
2. decreasing the time taken to attain the desired goals
3. increasing the capacity of teachers in terms of numbers of learners taught,
4. reducing costs, without affecting quality.

Such an approach, it was quickly discovered, made it necesary to view the education system as a whole. It was felt that any recommendations for improvement should be based on a knowledge of appropriate educational research findings and theories of learning. In many cases, ideas and practices drawn from such diverse fields as psychology, sociology, business management and systems analysis are combined with developments in more technical fields such as optics, reprography, acoustics and microelectronics in order to produce the optimum learning or teaching system.

In the developed countries, these aspects, which are all part of the technology of education, are sometimes called the 'intangible' aspects or the 'underwear' as opposed to the hardware and the software already described.

Technology in Education:

'Technology in Education' embraces every possible means by which information can be presented. It is concerned with the 'gadgetry' of education and training such as television, language laboratories and the various projected media. In other words technology in education is basically the popular impression of what education technology is all about, namely, audio-visual aids. It is common to distinguish two related areas: hardware and software. In the UK, as elsewhere, one of the earliest phases in the evolution of educational technology was the 'hardware phase'. It was soon realised however that although excellent engineering products were available, there was a shortage of suitable 'software' to use with it. This triggered off a subsequent 'software phase' in which particular attention was paid to development of suitable learning materials, often based on contemporary theories of learning and perception.

However, at this stage, many people became aware that there was much in education and training which could be improved by thinking more carefully about all aspects of the design of teaching/learning situation. Such considerations led to a new interpretation of 'educational technology' as the entire technology of education rather than merely as the use of technology in education, with the latter being regarded as merely a part of the former rather than the whole field as had previously been the case.

In line with the systems approach to media selection mentioned above, the UK scene exhibits a shift away from the indiscriminate way in which mediated learning materials were at one time applied to the learning experience. There was a time for instance when tape-slide programmes were expected to facilitate almost any kind of learning, although the attributes of that particular combination of media clearly are not relevant for all types of learning. The major endeavour of educational technologists has been to identify the characteristics and attributes of the various media available and to classify them according to the different types of learning which they facilitate or to relate the learning mode with which these media are associated to the characteristics of the individual learner.

The Electronic Media

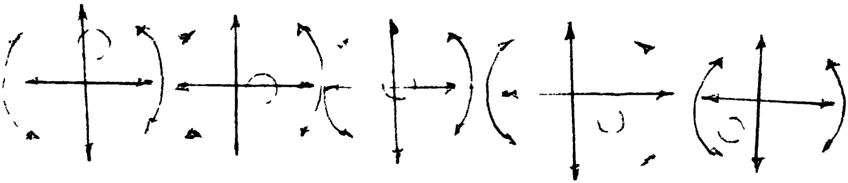
In recent years, the technologies of micro-electronics and communications have lead to the emergence of pocket calculators, video discs, electronic tutors, electronic data networks, interactive cable television, videotex and more. Despite the proliferation of such gadgets, the tendency in the UK is to view their possibilities with some doubt. It is suspected that the educational opportunities provided by these electronic media are uncertain and will remain so until a precise functional description is available of how learning procedures will benefit. It is being increasingly realised that part of the problem seems to lie with the preoccupation with hardware-oriented descriptions of what the technology can do. While these descriptions may outline technical achievements in terms of information access-time, voice or touch-screen input, gigabyte memory and graphics display, they do not explain how any educational potential can be realised.

In fact any endeavour to establish a firm relationship between education and electronic media appears to suffer from a theoretical weakness. It is clear that in the UK or elsewhere no educational model or theories of media exist that can accomodate the features characteristic of the electronic media now available.

The Media Quadrant Model

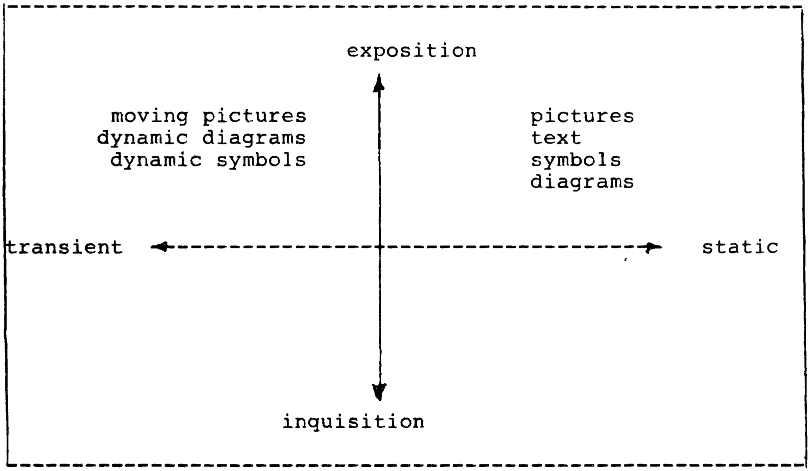
All teaching by definition requires the transfer of information. In a teaching situation the information transfer is often thought of as being one way: from teacher to learner. All research points out, however, that it is highly desirable that certain information, such as the learner's knowledge state, should be transferred to the teacher. Pask develops this notion much further in his 'conversational theory'.

It has been demonstrated that when the teaching agent is able to invite learner-response, the efficiency of the teaching and learning process can be singnificantly increased (Gropper, Campean). In an efficient teaching situation exposition, the presentation of



teletext videotex CAL 'Little Professor' 'Dataman'

Position of five electronic media on the media quadrant model



Visual-image categories positioned on the quadrant model information, should ideally be accompanied by inquisition. The Media Quadrant Model places these two elements - information presentation and inquisition - at two extreme ends of a vertical continuum. On the horizontal continuum are plotted two other elements : transient visual images (e.g. film, videotapes etc) and static visual images (e.g. printed text). This model then can be used to illustrate the presentation characteristics of the media. For instance, ETV by satellite, a matter of prime concern in India at present, is transient and expository. This places severe limitations on the educational objectives it can achieve. This is not to say that ETV is totally ineffectual. But it certainly shows that ETV must be skillfully woven into existing educational patterns so that it can play its part. Here is a classification of some other modern media:

The advantage of the model is obvious. It suggests that an ideal medium is one which posseses the visual image categories identified, has an audio capability and can extend fully into all the dimensions of the quadrant model. It is evident that although all these capabilities exist disparately they do not do so in an integrated form. The interactive video disc and tape seem to have the potential to integrate these capabilities and may well prove to be the ideal educational media. Whether they prove cost efficient in the Indian situation can only be known through empirical research and it would appear desirable to have a pilot project initially to develop some hypotheses.

Computer in Education

Over the last decade or so, the range of uses of the computer in UK education has expanded rapidly. Although at first its role was largely confined to that of a 'supercalcuator' it is now also used in a wide variety of other ways, some of the important of which are listed below:

Use of Computer as a Supercalculator

The main role was as a tool to carry out complicated and time-consuming calculations as part of academic research programmes. In most UK institutions, students routinely use computers to calculate the slopes of graphs, carry out statistical tests on data and compute results of experiments - tasks that not too long ago were done with the help of calculators, slide rules of logarithmic tables.

Use of the Computer to Teach about Computers and Computer Programming

Following on from their original applictions in academic research, computers eventually started to be used as computer for computer programming. At present, there is hardly a secondary school or tertiary education establishment in the UK that does not include at least some computer science or computer programming in its curriculum. It is now becoming increasingly widely recognised that almost all of tomorrow's citizens will have to acquire computer literacy if they are to be able to cope with the technological complexities of everyday life. Clearly the use of computers as vehicles for the achievement of these various educational goas is almost certain to continue to increase.

Use of Computers as Direct Aids to the Teaching/Learning Process

A third way in which computers have been able to make a major contribution to education and training is in computer-assisted learning (CAL), in which the computer plays a key role in the teaching/learning process. When employed in this role, the computer is normally used in one of two distinct modes. In the first, the computer acts as a substitute tutor with which the student can participate in an on-going dialogue via an interactive terminal of some sort. In the second, it acts as a simulated laboratory, providing facilities whereby the student can carry out 'experiments' on a model system that has been programmed into the computer.

Use of computers in an Administrative or Managerial Role

Yet another area in which computers have ben used in education is in an administrative or managerial role, helping with, for instance, the overall administration of the system, timetable planning, budgetary control and the management of the teaching/learning process. This role is generally described as CML : Computer Managed Learning.

Use of the Computer as a Data-Base

One of the first manifestations of the 'new information technology' explosion that is currently changing the nature of industrial societies was the establishment of vast computerised respositories of information such as the US based ERIC and the British PRESTEL interactive videotex system. Although the interactive video systems are very much in their infancy, basically they attempt to use two relatively well-established teaching media - video recosrders and computers - in an integrated teaching resource. Current indications are that a combination of microcomputers with videodisc players may offer the best choice. This is mainly because it is very much easier to obtain access to specific sequences or frames of a programme using a videodisc system, since there is no need to wind a tape forward or backward in order to do so.

Current Thinking

The general trend appears to stress the concept of appropriateness. It is generally understood that care needs to be taken to identify and develop through the computer, learning opportunities that cannot easily be provided in any other way. In other words, the undoubted strengths of computers must be made the most of. It is in no one's interest simply to use them becuase of their availability, or to employ them as gimmicks.

Research and Development

The application of new technologies in education must not be looked at in isolation from cost effectiveness and efficiency, factors that are vital for successful application and implementation, must be taken into account even though a little caution is to be exercised in terms of long term, large scale researches at the beginning phase of the application of new technologies. Yet ongoing, monitoring evaluation must be carried out as and when experimentation with new technologies is tried.

Learning from Television

Research on learning8from television can be divided into two broad categories: educational utilisation and general issues.

Educational Utilisation:

Bates reviews research done on the UK Open University TV programmes:

The functions of the programmes, in terms of the skills required of students and the way content was treated, were quite different from those of the correspondence text. The correspondence texts were theoretical, analytical and didactic. The television programmes dealt with concrete situations, presented images of complex, real-world situations and were open-ended, open to interpretation, and non-analytic. Producers and academics expected students to analyse the television material, using the theoretical or analytic constructs provided in the correspondence text to apply what they had learned in the text to the real-world situations observed in the television programmes, to generalise or draw conclusions from the specific instances in the programmes, to test, evaluate, or compare the applicability of general principles in the text to the 'real world' instances found in the television programmes.

In several instances, the programmes were the only places in the course where students were able to develop or practise these kinds of learning skills, other than in answering assignment or examination questions.

Academics and producers in most cases agreed on the relevance of the programmes to the course - they saw a congruence between the content of the programmes and the content of the correspondence texts, although the treatment of content and the choice of examples were different.

For some of the programmes investigated, a majority of the students did not think that the programmes were very relevant or 'helpful'.

For most of the programmes investigated, a large minority of students misunderstood the purpose or function of the programmes - they were looking for the programmes to provide new content or explanation of the difficulties encountered in the correspondence text.

Less than one-third of students, for any programme, both understood the purpose of such programmes and appeared able to use the programme material in the ways suggested above. One-third of students on an average did understand the purpose of such programmes, but appeared unable to use the programme material in the way intended.

A majority of students wanted more help in using such programmes.

The implication is quite clear. Students do not autmatically know how to use instructional television to the best advantage. The further a programme moves away from overtly didactic teaching, the more help students need to develop the necessary skills to benefit from such programmes.

Issues

Palmer summarises the kind of questions any research on the use of the media should try to address.

What do we know from our results today about the uses and limitations of television to motivate learning?

What do we know about how to design and utilize programmes in the light of individual or inter group differences among viewers?

What do we know from our research and evaluation results about elements responsible for successful educational applications of the media?

How can we best ensure the productive and efficient accumulation of knowledge from our research on educational television and radio?

What do we know, and what do we need to know about how to tie different media to one another for maximizing their combined educational effectiveness?

Is it possible that we are regularly underestimating in our evaluation work the effectiveness of educational television and radio?

What do the results tell us about the kinds of outcome the media bring about? In what ways and for what sorts of application have they proved most effective?

Can we now begin to develop some decision rules about such things as when and where not to use television or radio?

What role can television, and other media used in association with it, play in bringing about educational reforms?

What are the cost-benefit advantages of educational television and radio?

What criteria should we use to judge the value of research in educational television and radio? How valuable has research been up till now?

At a time when India is embarking on a major education by television project, it will be extremely useful to initiate research to find answers to these questions.

It would appear that three important underlying trends can be identified in current educational technology: a more student-centred approach, awareness of the importance of non-cognitive skills and attitudes and increase in the use of new information technology.

A Student-Centred Approach

The UK system exhibits a gradual but definite shift away from the traditional teacher-centred paradigm towards a more student-centred approach. Even within the formal education system, where the traditional approach still dominates, there is a wider use of resource centres and of mediated and individualized learning in all their forms. Most UK educationists confidently expect the trend to continue and become stronger through the current information technology explosion which is making student-centred learning progressively more practicable by making available new and more effective vehicles for mediated learning. Also more and more people in the UK are finding that they have to continue to study after they finish their formal education in school or university. This has given rise to increasingly student-centred systems like the 'Open-Tech' system. With the increasing need to retrain people for completely new jobs at regular intervals throughout their working lives, the importance of this type of system seems certain to increase.

Awareness of the Importance of Non-Cognitive Skills and Attitudes

The importance in real life of positive attitudes and social skills - what might be termed the affective and the interactive domains - is being increasingly appreciated and a truer perspective on personality development being developed. From this point of view, there is an increasing tendency to use group learning for affective and interactional skills and leave the learning of cognitive skills to student-centred techniques, including the use of educational technology.

The Use of New Information Technology

There is a universal agreement that new information technology seems certain to play an increasingly important role in future education in the UK. The new information technology can be thought of as the application of new electronic and other technology (computers, communication satellites, fibre-optics, videorecording etc.) to the creation, storage, selection, transformation, and distribution of information of all kinds. With the increasing availability in an average British home of videorecorders, computer-based data retrieval systems, electronic games, mediated instruction systems, an increasingly large proportion of the education of the future seems likely to take place outside school. Most educationists in the UK agree that this development will have far reaching implications both for the British society and the British educational system.

Cost-effectiveness

Often, educational technology in general and the media in particular are propagated on cost-effectiveness grounds. We are now developing more sophisticated insights into factors that affect cost effectiveness and are moving away from the surely quantitative criteria which were commonly used in the late fifties and the sixties. It is commonly agreed now that any modern cost-effectiveness evaluation will need data on the measurement of cognitive learning, measurement of affective learning, cost data for teachers, ancillary personnel, learning space, materials, delivery systems (media) and capital outlay amortization, statistical data for teacher-pupil ratio, drop-out rate and number of graduates.

Practicality

Overall considerations relate to the time available for course preparation, availability of production services such as television or recording studios, film development laboratories, dust-free environment, facilities for maintenance and often dependable stablized power supply.

Human Resources

It is important to know something about the preferred learning styles of students, preferred teaching styles of teachers, willingness of the administrators to make the necessary adjustments to their style of functioning. It is also important to know the reaction of parents and employers.

Due to mystical belief in technology, often enthusiastically fuelled by aggressive sales promotion,s the educational scene is periodically invaded by new fashions in educational technology. Few teachers in their early forties and above will forget the much heralded arrival of programmed learning, teaching machines and language laboratories. Much visdom has been gathered since both about the possibilities and limitations of educational technology.

INDIAN SITUATION AND USE OF TECHNOLOGY FOR HIGHER EDUCATION

India has adopted a path of development by employing science and technology. In the field of communication technologies and micro-electronics, it appears from the measures already taken, that the country plans to develop high indigeneous technology by initially buying high technology from the developed world and developing it further to become self-reliant and self-supporting. Establishments of plants for production of VLSI chips or pure silicon are the steps in this direction. The country cannot wait for the indigenous production for the development in these technologies and, therefore, simultaneously liberal import of major basic components has been permitted for the production of computers, colour television (CTS) sets, VCRs etc. About dozen or two industries have started manufacturing mini and micro computers. Many small and big industries are producing CTV, VCR etc.

Information communication networking has been taken up as the major national programme, INSAT-1B and further satellites in the INSAT series have been planned to establish space links for television transmission, telephone networking and other data transmission. By the end of 1984, nearly 70% population and region of India would be covered by the low and high power relay transmitters of television programmes. Within the next 5-7 years it is expected that the whole country would be covered by television transmission simultaneously providing many transmission channels. Television programme production and relay stations in many regional cities of each state of India would also be established. Telephone network is already getting established through micro-wave and satellite links. It is also linked with the international telephone communication network. Computers are getting wider usage and some Central Government Departments have planned for National computer network for storage and exchange of information necessary for security, law and order, problems and investigations. All these and many other measures reveal the policy of establishing the information network.

The U.G.C. has been given one hour for television transmission on the National T.V. network. Wider utilization of these technologies through educational networking can be envisaged and established for teaching, research and extension activities of higher education.

AVAILABILITY OF TECHNOLOGIES AND CONSTRAINTS:

(i) Basic equipments for communication technologies are the Computers, TV and VCR for reception and display. The black and white TV is available for Rs.1200-3000 and the colour TV for Rs.5500-11,000. The VCR costs about Rs.12000-15000. Micro computer costs in the range of Rs.60,000-1,25,000 and bigger micro-computer systems cost between Rs.1.20 to 6.0 lakhs. Mini computers range from Rs.6 to 15 lakhs.

Television is entering into most of the families with the income over Rs.10,000 per year. However, lower income families would find difficult to buy television in the house. The computers and VCR would be out-of reach of practically all unless prices of small computer fall to the value comparable to the T.V. prices.

(ii) Constraint of Poverty: Nearly 45 per cent of the Indian population is below poverty line and is mostly concentrated in rural areas. In big industrial cities nearly 20-35% population lives in slums hardly having proper living facilities. The communication technology therefore cannot reach the poor families and houses individually. As it often happens the benefits of the communication technology developed with commercial approach would also go practically entirely to rich and already developed strata and would widen the gulf between haves and have-nots. The technology has to be adopted with the policy of social welfare with community approach rather than the individualistic approach. Technology appropriate for community use, for example projection T.V., highly reliable and sturdy systems, etc, have to be developed and installed for community use.

(iii) Audio-Visual Culture: One of the major factors that may contribute to the success in the spread and adoption of communication technologies is the 'audio-visual culture' of the Indian society. It is evident from the folk arts, festivals, attraction for various forms of performing arts, meetings, speeches etc. Audio-visual medium would therefore be of great value for entertainment and education, if used effectively.

(iv) Diversity and Integration: India is a big country like a continent having linguistic, religious and cultural diversity. However, unifying Indian culture that has created this country as an independent nation integrates all inspite of the diversity. The communication net-work can be used very effectively for strengthening the national integration. Education has to play a great role in this unification and hence the use of communication technology and communication channels for education should be accorded the highest priority. Educational audio-visual software have to blend diversity with unity. The modern technology is breaking the space barrier so fast that the earth is going to be a single close entity like a village. The communication net-work would get linked with the net-works of other countries and would create possibility of access to the worldwide information. Internationalism would be one of the important approaches that needs to be adopted in preparing our network and software.

(v) Social verses Commercial Utiliztion - Development of appropriate technology to suit Indian conditions, particularly for community or group use is one of the most important tasks. The technology has to be reliable, of good quality and quite economical for large scale utilization.

The commercial forces have already started operating and exploiting the technology for their economic benefits. This is evident from widespread video parlours, use of audio-cassettes for coaching classes and video-tapes for advertising, entertainment etc. The commercial utilization, besides being exploitative, will not undertake larger issue of net-working for educational and development purposes. The Government has to have a long term plan and to invest in developing hardware, soft-ware and courseware that would fulfil the needs of individual, social and national development.

SOME MEASURES:

It is therefore proposed that the large scale financial support be made available by the Government and the University Grants Commission for the following programmes. The objectives of the programmes should be the large-scale propogation of the new-technologies at all levels throughout the country.

(i) Computer Literacy:

Computer is a basic tool or brain in the field of communication technology. Since the future society is going to be knowledge based society wherein computer is going to play dominant role, the computer literacy has to spread amongst all the students at higher, middle and lower levels of education.

The Government has adopted a programme of computer literacy at the higher secondary level. About 250 schools in India would each be receiving 3-4 pieces of B.B.C. micros along with the soft-ware programmes for teaching-learning various subjects. However, each BBC micro costs quite high and hence very few pieces of equipment are made available. The programme of literacy has to be envisaged on mass scale and very large number of students should have free and easy access to the micro-computers. Unless micro-computers with far lower costs are provided in large numbers in all the high schools and colleges, the computer culture, basic to future technological society, will not spread in India.

We therefore propose that the computer literacy programme be undertaken on a very large scale. The programme should develop necessary hardware and software suitable for our socio-economic conditions.

(ii) Micro-electronics education:

Microprocessors are bringing about slow revolutionary changes in industry through process control and robotics.

It is also entering into social services, markets, administration, banking etc. In fact all walks of life would be radically affected by the use of this 'brain' - the microprocesssor. The younger generation should have the knowledge and skill of using electronics required for applications of microprocessors.

It is therefore proposed that a large scale programme that will teach basic skills of electronics applications to the high school and college students be undertaken. In fact various types of kits of electronic components be designed and made available in large number at reasonable cost. Once the basic electronic skills spread, its widespread applications will also get developed contributing to the rapid progress.

In fact the recent proposal of the Department of Electronics to import, wherever necessary, the electronic components and sell them without any taxes is welcome one. It would make the components available economically and would help both in the computer literacy and electronics education.

(iii) Maintenance and repair:

This would also pose great problems. Hence teaching and training of personnel at specialised and technician level has to be organised. Since the technology would also be used widely in rural areas, the training should be comprehensive with multiple skills so that the technicians can serve well and maintain themselves through their service.

(iv) Software development:

It has been often noticed that the technological development far exceeds its utilization. The INSAT-1B satellite can serve far more, but is under-utilized since the support establishments like transmission and receiving centres are all not ready and, further, enough soft-ware programmes are not available to utilise TV transmission channels fully. The computer literacy, micro-electronics education would be able to create interest and understanding of the technologies. Soft-ware development should be taken as a major programme. India can develop software for its own use and these programmes having universal relevance can be exported. In fact this has already been identified as the most promising and profitable area for export but our efforts are still very meagre. Development of human resources on an extensive scale would give us the desired success.

NETWORKING

Along with the programmes of develping culture and education to generate skills and knowledge in the areas of computer and electronics applications, it would be essential to undertake projects for establishing communication information networks in areas, vitally important to higher education. We propose here some areas which we believe, would help the Universities and U.G.C. in carrying out their functions effectively and efficiently.

(i) National R & D Information Net-work:

The idea is to store and disseminate all the information about the research and specialised studies in various subjects required for research and development. This will be the information base for the research workers in Universities, Government and private R and D institutions.

A centre has been established by the U.G.C. in Bangalore to create computer storage of such information in science subjects. However, networking is yet to be established.

We propose that a project of National R and D network be undertaken jointly by the establishments and Government Departments like DOE, CSIR, UGC, DAE etc. The project should identify the research institutions and Universities for storing all the R and D information in subjects in which the institution has expertise and interest. The stored information be communicated to all the member institutions interested in receiving the information. In future, computer net-work be established so that the information can be transmitted by the storing institution to all the member institutions.

(ii) University Educational Information Net-work;

Each university calls for the information from its affiliated colleges and institutions for its administration and decision making. The U.G.C. also requires information from colleges and Universities for carrying out its functions of giving grants deciding policies and programmes for maintaining standards of higher education. All these functions should be greatly helped, if every college and University has a computer of appropriate size. Compatible programmes could be developed and the colleges and universities can receive and transmit information through floppies initially and later on through the net-work linking all computer systems in universities and U.G.C.

Along with the computer net-work, audio and video-net work for educational software could be established. In fact these concepts need to be implemented on pilot-project basis for limited number of institutions and after the successful implementation, they could be blown up to include all the institutions.

(iii) Local Comprehensive Net-work:

A project could be undertaken at 4-5 places in different parts of the country to develop comprehensive Network that would store and disseminate information in various areas of interest such as educational information, information regarding travel, tourism, banks, market, social and entertainment services etc. Such a net-work would involve all sections of society, many private, publiic and Government establishments. Such a net-work would be the first step towards the establishment of the National Information Network.

(iv) Open National and State Universities:

Open University uses distance education technology for teaching and learning and hence establishment of a National Open University and State Open Universities for each linguistically different region would give a big boost to the development of appropriate technologies and educational software. Coordinated and cooperative efforts of the Open Universities would help in establishing nationwide educational network that could use all the modern technologies.

RECOMMENDATIONS

It is of great satisfaction that our country has adopted a policy of harnessing modern technology for the purpose of coordinated national development. India has taken a giant step forward by putting INSAT-1B for communications and by establishing television transmitters to cover nearly 70% of Indian territory and population.

We should recognise at this stage of technological development, the unlimited potential of new technologies in the dissemination and spread of quality education to large number of learners in rural and remote areas who are deprived of adequate facilities of higher education. The micro-electronics and communication revolution, particularly with the micro-processors, has made it possible to bring education at a reduced cost to a large population which is not able to participate in the formal system of education.

(1) The Task Force appreciates and supports the efforts at the National, Regional and Institutional levels for the creation and strengthening of facilities in the field of new technologies and recommends that the Planning Commission and other national agencies like, UGC, Department of Electronics, Ministry of Education etc. should allocate larger resources by recognising great potentialities of the new technologies.

(2) We recognise the advances achieved in the area of educational technology and its significance in higher education with special reference to teaching, research and extension. We welcome the programme of using INSAT-1B for higher education through Nationwide classroom and establishment of the six Audio-visual Resource Centres and Eductional Media Research Centres in different universities by the University Grants Commission.

(i) The Task Force recommends that further support be given to strengthen these centres in order to develop them into viable nuclei of training, research and development, AV-material production for national and regional programmes of distance education and extension ectivities.

(ii) By considering the linguistic and cultural diversities existing in India and the task ahead of education with new technologies, the Task Force urges the UGC to create AVRC's in all the Universities and at least one EMRC in each State or region of India during the next five years. The EMRC's should be established in a lead university in the region and should be given responsibility of coordinating and supporting the activities of AV-procuction, teaching, training etc carried out by university AVRC's in the region/state.

(3) The Task Force recommends that a National Centre of Educational Media Research be started for carrying out studies and research, both in hardware and software aspects of the new technologies. It should be remembered that at present different types of hardwares are being manufactured in areas of computers and communication equipment. Diversity would create problems of compatibility of softwares produced and hence research in these areas directed towards proper and optimal utilization of new technologies in higher education is very essential. The centre should in general, coordinate all the efforts of various agencies and universities in this direction.

(4) We recommend that a separate TV transmission channel be exclusively reserved for educational purposes.

(5) Information Communication Net-working:

Computer and communication technology is establishing knowledge base by creating and storing information and allowing the information to be received and used by the people by creating information net-work. Already, in India, communication net-work for telephone is getting established. Similarly information net-work would have to be established for the whole country.

This is no doubt a stupendous task and has to be started at micro level in various areas of cultural, educatinal and professional fields. In this respect we should learn from the efforts of the developing countries but we should not copy the west and should evolve our own system of information base and its sharing that would suit our economic and cultural situation. Because of economic backwardness, we should see how we can reach groups of institutions instead of individuals through cooperative and collective sharing.

(i) We recommend that pilot programme at 4-5 places with decentralised approach to allow innovativeness and diversity, be conceived and started. The programmes should collect information in the identified areas of interest, put it on AV-media and arrange for dissemination through broadcast as well as non-broadcast way. One or some of the Information and Broadcasting transmitters and communication net-work be allowed to be used for transmitting programmes and communicating information to the identified groups and institutions. Sucessful creation of micro-net-working would give experience for establishment of nation-wide information-communication net-work.

(ii) Quality of higher education depends on the up-to-date knowledge base available to a researcher in his field of research. We recommend that for higher studies and research in Universities and R and D institutions, a net-work be created with storage of specialised information on research publications, their abstracts/results etc. at different places in the country. They should be linked to all R and D institutions, Unversities, Post-graduate departments etc. through communication net-work which may use microwave links and satellite,. Till this net-work is established, non-broad-cast ways of dissemination of information be used.

(iii) The UGC has provided computer facilities too and established AVRC and EMRC in some universities by providing hardware and software resources to carry out efficiently the functions entrusted to them. However in the computer and communication age in which we are entering now, every university should have sizable computer facility and every college must have some minimum of these facilities. In particular, we recommend that every college must be provided with

(a) a Micro-processor based computer with a CPU, floppy disc drive (1 MB formated capacity), magnetic disc drive (10 MB formated capacity) with a fast printer and dot matrix printer possibly with three terminals.

(b) A VCR with a monitor (projection TV) capable of showing video programmes to students in a class. (single unit upto 1000 students, multiple units for increased student strengths).

A group of colleges may be provided with centralised facility for editing and preparing software material.

(iv) For educational decision making either at the UGC or at the University level we often need information. With the availablity of computers in colleges and universities information can be collected in standard formats with consistent and compatible softwares and can be communicated to the colleges, universities by the UGC or received by the UGC from the colleges and universities.

We recommend that the UGC should undertake the establishment of such an information net-work to communicate all the information, decisions etc between the higher educational institutions in India.

(v) We recommend the establishment of a communication research data-base and a communication net-work for extensive and efficient utilization of this data on a national basis by education, industry and government agencies. For this purpose select research projects at the local level be initiated to test the validity and usefulness of such networks.

(6) Coordination at National level:

(i) In the initial stages, the Education Media Research Centres would not be able to prepare enough audio-visual programmes to fill-up one hour allocated for higher education. Further, the best video programmes that have universal acceptability and are value free should be obtained from different countries and after appropriate changes, should be shown on TV net-work. They should also be made available in video-cassettes.

(ii) We recommend that comprehensive list and storage of resource material available from other countries to serve Indian students be prepared.

(iii) Detailed information regarding infrastructure and facilities that are available and are being made available in the next 2-3 years with respect to INSAT-1B and support communication media and computers should be collected by a central agency and disseminated to organizations and institutions of higher learning.

(iv) Coordinating function at the national level for various types of functions can be done by the UGC and Association of Indian Universities.

The Task Force recommends that AIU be considered and given responsibility of clearing house for all information regarding INSAT-1B, micro-computers, communication equipment and the role of these in communication of information relevent to higher education. Initially the AIU can solicit information from agencies, universities and others on what is available at the moment by way of software support, by way of areas in various syllabi and their courses that can lend itself to communication through this media, software and courseware already available and so on.

(v) We recommend that a plan of action in collaboration with other agencies like UGC, Ministry of Education etc. to be implemented by AIU clearing house utilising all help particularly from agencies from abroad.

(7) Technology import:

The developments in the new technologies of computers and communications are taking place so rapidly that there is a growing fear of increasing disparities between our technologies and those of developed countries. A country like India has to become self-supporting and self-reliant in the new technologies also.

In the areas computers and communication, soft-ware development is assuming significant importance and offers very attractive world export market. Lack of hardware facilities would hinder the development of expertise and software product needed for ourselves and for export.

In order to reduce the gap of disparities in hardware and in the human resource development required for the areas for higher education, we strongly recommend that import of essential equipment required for developing expertise and software by the Universities be allowed during the 7th plan period. At the same time, more entrepreneurs and R and D agencies be encouraged to produce the equipment indigenously at competitive prices.

(8) Training for software preparation and maintenance:

(i) We recommend that universities should undertake studies and R and D in development of technology suitable to our needs besides studying the new technology that is getting evolved for further development.

(ii) Studies, investigations and research and development projects in respect of utilisation of INSAT-1B should be undertaken by Universities. All these research activities need to be financially supported by the national funding agencies.

(iii) Maintenance of equipment in communication and computer technologies would pose serious issues. We recommend that the training of technicians and skilled persons be taken up. The persons be trained in multiple skills so that their utility particularly in remote/rural areas would be enhanced.

(iv) We should first identify areas of aplications and uses and then identify sutable technology. What to convey should be known first than how to convey.

We recommend that large scale soft-ware production should be ensured through proper orientation. However, preparation period should not delay our activities. We learn better through active particiation since all training programmes to suit our conditions would not be available.

(v) The AVRC's and EMRC's should be entrusted with the responsibilities of short term and long term training programmes as well as material production for the national as well as regional broadcast of educational programmes.

(vi) For the purposes of software and coursewere production, we recommend that multi-disciplinary teams of experts and specialists in education, language and media technology be formed and team approach be adopted. Training for re-orientation and material production should be given to such teams.

(vii) The Task Force further recommends that these teams of specialists should plan and produce appropriate media packages for programmes at the local colleges, university level, and at the regional, state level and national level, both in regional languages and in English.

(9) General Support:

(i) We recommend that research in distance education and production of educational software should be given due recognition in the educational system. The institution of cash awards and certificates of merit may be an additional incentive for teachers to increasingly undertake such activities.

(ii) We recommend that adequate academic rewards must be provided to teachers participating in the programmes of educational technology at all levels of teaching, research and extension.

(iii) We recommend to the U.G.C. as well as the State and Central Governments to make funds available under a separate head for educational technology in higher education. Efforts should also be made to generate resources from the industry and society at large.

(iv) We further recommend that in order to support teaching, research and production of software activities and to disseminate information, a journal devoted to New Technologies in Higher Education be supported and/or started by the U.G.C./AIU.

APPENDIX I

LIST OF MEMBERS

1. Dr. R.G. Takwale
Vice-Chancellor, University of Poona,
Pune-411007.

2. Dr. Ashok Chandra
Department of Electronics
(Now Education Adviser (Tech.)
Ministry of Education)
New Delhi-110001.

3. Prof. C.S. Jha
Education Adviser (Tech.)
Ministry of Education and Culture,
(Now Prof. of Electrical Engg.)
IIT,
New Delhi.

4. Prof. Rais Ahmed
Vice-Chairman, University Grants Commission,
New Delhi-110002.

5. Dr. Prakash Deshpande
British Council,
Rafi Marg,
New Delhi-110011.

6. Mr. R.S. Shastri
Director (Engg.)
Directorate of Doordarshan,
6th Floor, Loknayak Bhawan
New Delhi-3

7. Shri K.S. Karnik
Space Application Centre
Ahmedabad-380053.

8. Dr. E. Balagurusamy
Sr. Consultant and Professor of
Information Technology,
Institute of Public Enterprises,
Osmania University Campus
Hyderabad-500007.

9. Mr. Joginder Singh
United States Educational Foundation in India
Fulbright House,
12,Hailey Road,
New Delhi-110001.

10. Mr. R.S.Lugani
Principal, Delhi Public School,
Sector XII, R.K. Puram,
New Delhi-110022.

11. Prof. A.J. Kidwai
Mass Communication Research Centre
Jamia Milia Islamia, Jamia Nagar,
New Delhi-110025.

12. Prof. P. Sen
Dean, Faculty of Engineering and Technology,
Jadavpur University
Calcutta-700032.

13. Dr. Jagdish Narain
Secretary, Association of Indian Universities,
New Delhi-110002.

14. Prof. V. Natarajan------Member Secretary
Project Director (Exams.)
Association of Indian Universities,
New Delhi-110002.

APPENDIX II

QUESTIONNAIRE

SECTION ONE

1. Name of the official filling the questionnaire: ____________________________

2. Designation : ____________________________

3. Name of the Organisation/ Agency/Institution : ____________________________

4. Objectives of the Organisation/Agency/ Institution

5. Broad activities of the organisation/ Agency/Institution

6. Responsibilities/involvement with regard to higher education (give details)

   (i) ·Planning

   (ii) Conduct

   (iii) Monitoring

   (iv) Evaluation

SECTION TWO

(1) Have you introduced/implemented new technologies in your area of work in Higher Education

Yes No

If yes, what are the new technologies introduced/ implemented

(i) Microcomputers ______

(ii) Video Discs ______

(iii) Microprocessors ______

(iv) Still picture television ______

(v) Communication Satellite ______

If no, does your agency/organisation/institution propose to use or recommend the use of these in the next 2 to 3 years? Give details.

SECTION THREE

1) Computers used by your organisation/agency/institution

Main frames ______

Minicomputers ______

Microcomputers ______

2) Has your organisation/agency/institution conducted computer awareness (Literacy) courses? Give details.

3. Educational computing has been used for

(a) Computer assisted learning through

(i) Drill and practice simulation (give details)

(ii) Learning game (give details)

(iii) Tutorial/problem solving (give details)

(b) Computer assisted instruction (give details)

(c) Computer managed instruction including

(i) Test construction

(ii) Marking analysis

(iii) Identification of learning paths

(d) Computer based teacher support

  (i) Central Cataloguing data base

(e) Courseware (Educational support material)

  (i) Programming languages

  (ii) Programme documentation

  (iii) Lesson plans

  (iv) Curriculum Design

  (v) Supplementary resource material

SECTION FOUR

Has your agency used or recommended to use video technology like

(a) Video cassettes for subject matter/enrichment

(b) Video cassette recorder

(c) Video cameras

(d) Video discs

(e) Video tapes

Has your agency used or recommended to use video software for teaching/ learning, as nonprint teaching material. Please give details.

Has the duplication and distribution of video cassettes been done?

Video discs/cassettes/tapes have been used for

(i) education

(ii) enrichment programmes

Have you used or recommended to use interactive packages like

(a) Microprocessor computer for storage and retrieval of information

(b) Processing of data

(c) Video technology like video cassettes and discs

If so, give details.

(6) Does your agency/organisation/institution use or recommend to use programmes for broadcast through satellites, Insat -1B and future Insat satellite

(7) Does your agency/organisation/institution undertake or propose to undertake research studies, investigations into applications of new technologies in higher education. Give details.

(8) Does your agency/organisation/institution use new technologies other *than those mentioned in the questionnaire in teaching/learning in higher education? If so, give details.*

(9) Does your agency/organisation/institution train or propose to train personnel for

(1) Hardware operation

(2) Hardware mainterance

(3) Software development

(4) Software use

(5) Categories for training

  (i) Teachers

  (ii) Communication expert

  (iii) Production assistants

  (iv) Maintenance personnel

(10) Does your agency/organisation/institution obtain or propose to obtain systematic feedback information from the users?

(11) Does your agency/organisation/institution experience any resistance in use of these new technologies. If so, how does your agency/organisation/institution propose to tackle and motivate users to adopt new technology.

BIBIOGRAPHY

1. Bates, Anthony W (1983) Adult Learning from Educational Television: The Open University Experience. In Howe, Michael A.J: (ed) (1983) *Learning From Television*, Academic Press, London

2. Branscomb, Lewis M. (Winter 1981) The Electronic Library, *Journal of Communications*,

3. Bylinsky, Gene, (Oct. 1981) A New Industrial Revolution is on the way, *Fortune*

4. Cable T.V. (Aug. 1981) Coming of Age *Newsweek*

5. Campean, P.L. (1966) Selective Review of Literature on Audio-Visual Methods of Instruction. In Briggs, I.J.,Campean, P.L., Gagne, R.M. and May,M.A. (eds) *Instructional Media: A Procedure for the Design of Multimedia Instruction*. American Institutes for Research, Pittsburgh, Penn.

6. Cornis, Edward (April 1981) The coming of an Information Society, *The Futurist*

7. Daniel, J.S. (1978) Satellites in Education: experimenting for ever? In Brook, David and Race, Phillip (1978) *Educational Technology in a Changing World*. Kogan Page, London.

8. Gropper, G.L. (1967) Does Programmed television need active responding? *Audio-Visual Communications Review* 15.1.

9. Palmer, Edward (1976) Research Findings. In Bates, T and Robinson, J (1976) *Evaluating Educational Television and Radio*. The Open University Press, Milton Keynes.

10. Pask, G (1978) Conversational Techniques in the Study and Practice of Education. In Hartley,J. and Davies I.K. (1979) *Contributions to an Educational Technology*, Kogan Page, London.

11. Takwale, Ram (March 84) Insat-1B and Higher Education, *University News*

12. Tim Forester (ed.) (1981) The Microelectronics Revolution, *The MIT Press*

13. Report of Study Group Meeting on Applicability of Advanced

Technologies to Educational Development (1982) Unesco Regional Office for Education in Asia and the Pacific, Bangkok, Thailand.

14. Microelectronics Education Programme (1981) The Strategy, Department of Education and Science, Welsh office, Department of Education for Northern Ireland.

15. New Technologies in Higher Education (1984) University News.